Solaster endeca (Purple Sunstar)

Priority 2 Species of Greatest Conservation Need (SGCN)

Class: *Asteroidea* (Sea Stars)
Order: *Valvatida* ()
Family: *Solasteridae* ()

General comments: none

No Species Conservation Range Maps Available for Purple Sunstar

SGCN Priority Ranking - Designation Criteria:

Risk of Extirpation: NA

State Special Concern or NMFS Species of Concern: NA

Recent Significant Declines:

Purple Sunstar is currently undergoing steep population declines, which has already led to, or if unchecked is likely to lead to, local extinction and/or range contraction.

Notes:

recent decline - Cobscook Bay; climate change - Appelhans et al., 2012; Keppel et al., 2014; understudied as by-catch, Professional judgement

Regional Endemic: NA

High Regional Conservation Priority: NA

High Climate Change Vulnerability:

Solaster endeca is highly vulnerable to climate change.

Understudied rare taxa:

Recently documented or poorly surveyed rare species for which risk of extirpation is potentially high (e.g. few known occurrences) but insufficient data exist to conclusively assess distribution and status. *criteria only qualifies for Priority 3 level SGCN*

Notes:

recent decline - Cobscook Bay; climate change - Appelhans et al., 2012; Keppel et al., 2014; understudied as by-catch, Professional judgement

Historical: NA

Culturally Significant: NA

Habitats Assigned to Purple Sunstar:

Formation Name **Subtidal**

Macrogroup Name **Subtidal Coarse Gravel Bottom**

Habitat System Name: Coarse Gravel ****Primary Habitat**** **Notes:** *spawning, assumed juvenile feeding habitat, adult feeding habitat*

Macrogroup Name **Subtidal Mud Bottom**

Habitat System Name: Unvegetated ****Primary Habitat**** **Notes:** *spawning, assumed juvenile feeding habitat, adult feeding habitat, assumed over-wintering habitat*

Macrogroup Name **Subtidal Pelagic (Water Column)**

Habitat System Name: Nearshore **Notes:** *larval development and dispersal*

Habitat System Name: Offshore **Notes:** *larval development and dispersal*

Macrogroup Name **Subtidal Sand Bottom**

Habitat System Name: Unvegetated ****Primary Habitat**** **Notes:** *spawning, assumed juvenile feeding habitat, adult feeding habitat, assumed over-wintering habitat*

Stressors Assigned to Purple Sunstar:

Solaster endeca (Purple Sunstar)

Priority 2 Species of Greatest Conservation Need (SGCN)

Class: *Asteroidea* (Sea Stars)
Order: *Valvatida* ()
Family: *Solasteridae* ()

Stressor Priority Level based on Severity and Actionability

	Moderate Severity	High Severity
Highly Actionable	Medium-High	High
Moderately Actionable	Medium	Medium-High
Actionable with Difficulty	Low	Low

IUCN Level 1 Threat **Pollution**

IUCN Level 2 Threat: Agricultural and Forestry Effluents

Severity: Severe **Actionability:** Moderately actionable

Notes: Echinoderm larvae are exceptionally sensitive to excessive nutrients, toxic chemicals (including heavy metals, and pesticides), and/or sediments orginating from agriculture and the aquaculture activity. Adults are sensitive, but less so. Likelihood is high and increasing (high certainty). Current spatial extent is most severe in Southern Maine, but expanding along coast along with development of the aquaculture industry , so actionability is moderate, i.e. the threat can be minimized in newly developing areas expanding into the geospatial range of this species.

IUCN Level 2 Threat: Domestic and Urban Waste Water

Severity: Severe **Actionability:** Moderately actionable

Notes: Echinoderm larvae are exceptionally sensitive to excessive nutrients, toxic chemicals (including heavy metals and pesticides), and/or sediments orginating from water-borne sewerage and non-point run-off from housing and urban areas. Liklihood is high and increasing (high certainty), current spatial extent is most severe in Southern Maine, but expanding along coast, so actionability is moderate, i.e. the threat can be minimized in newly developing areas expanding into the geospatial range of this species.

IUCN Level 1 Threat **Biological Resource Use**

IUCN Level 2 Threat: Fishing and Harvesting of Aquatic Resources

Severity: Moderate Severity **Actionability:** Moderately actionable

Notes: Large-scale, unintentional by-catch of commercial bottom trawling reduces this top predator population and subsequently results in decreased benthic diversity through trophic cascades and thus decreases the availability of food for other species. Likelihood is high (high certainty) and large-scale (throughout the region), so actionability is low, but moderate in new areas for developing bottom trawl fisheries.

IUCN Level 1 Threat **Climate Change and Severe Weather**

IUCN Level 2 Threat: Habitat Shifting or Alteration

Severity: Severe **Actionability:** Actionable with difficulty

Notes: Ocean acidification results in decreased suvivorship of larvae, and growth and feeding by adult sea stars. Likelyhood is high and large scale. The ability to mitigate ocean acidificationis low.

IUCN Level 2 Threat: Temperature Extremes

Severity: Severe **Actionability:** Actionable with difficulty

Notes: Purple sunstars are cold-water species. Increased water temperatures have interactive effects with ocean pH decreasing survivorship of larvae and growth rate of sea stars. Likelyhood is high (high certainty) and large scale. Increased water temperatures are linked with lethal disease. Likelihood is unpredictable based on disease agent and thus can range from small to large-scale. The ability to mitigate sea temperature change is low.

IUCN Level 1 Threat **Invasive and Other Problematic Species, Genes and Diseases**

IUCN Level 2 Threat: Invasive Non-native-Alien Species-Diseases

Severity: Moderate Severity **Actionability:** Actionable with difficulty

Notes: Invasives such as encrusting colonial tunicates (Didemnum vexillum) could decrease availability of sea star prey, habitat and have other effects largely unknown at this time. Likelihood is high and large scale (throughout the region), so actionability is low.

Solaster endeca (Purple Sunstar)

Priority 2 Species of Greatest Conservation Need (SGCN)

Class: *Asteroidea* (Sea Stars)
Order: *Valvatida* ()
Family: *Solasteridae* ()

Species Level Conservation Actions Assigned to Purple Sunstar:

None. ***Only species specific conservation actions that address high (red) or medium-high (orange) priority stressors are summarized here.***

Conservation Actions Associated with the Echinoderms Guild:

Conservation Action **Category:** Research **Biological Priority:** high **Type:** on-going
Expand existing education and research among researchers and managers to improve understanding and management ability
Stressor(s) Addressed By This Conservation Action
Domestic and Urban Waste Water

Conservation Action **Category:** Policy **Biological Priority:** critical **Type:** on-going
Through education and collaboration, reduce the use of antifouling agents and biocides that negatively affect SGCN, and investigate alternative biofouling agents.
Stressor(s) Addressed By This Conservation Action
Marine and Freshwater Aquaculture

Conservation Action **Category:** Public Outreach **Biological Priority:** high **Type:** on-going
Encourage the use of more targeted fishing gear in order to reduce bycatch and habitat disturbance
Stressor(s) Addressed By This Conservation Action
Fishing and Harvesting of Aquatic Resources

Conservation Action **Category:** Research **Biological Priority:** high **Type:** new
Investigate the effect of various harvesting practices on the integrity of habitats and trophic and ecological systems
Stressor(s) Addressed By This Conservation Action
Fishing and Harvesting of Aquatic Resources

Conservation Action **Category:** Survey and Monitoring **Biological Priority:** high **Type:** on-going
Ground-truth mapped habitat and compare to historical maps to monitor change over time, may require updating mapping plans to map more frequently
Stressor(s) Addressed By This Conservation Action
Fishing and Harvesting of Aquatic Resources

Conservation Action **Category:** Research **Biological Priority:** high **Type:** on-going
Conduct research to support management, including but not limited to stock assessments, population genetics, population monitoring, etc.
Stressor(s) Addressed By This Conservation Action
Fishing and Harvesting of Aquatic Resources

Conservation Action **Category:** Public Outreach **Biological Priority:** high **Type:** on-going
Encourage the use of more targeted fishing gear in order to reduce bycatch and habitat disturbance
Stressor(s) Addressed By This Conservation Action
Fishing and Harvesting of Aquatic Resources

Conservation Action **Category:** Research **Biological Priority:** high **Type:** new
Research to understand how effects such as habitat modifications, population changes, and pollution can influence SGCN

Solaster endeca (Purple Sunstar)

Priority 2 Species of Greatest Conservation Need (SGCN)

Class: *Asteroidea* (Sea Stars)
Order: *Valvatida* ()
Family: *Solasteridae* ()

Stressor(s) Addressed By This Conservation Action

Habitat Shifting or Alteration

Conservation Action **Category:** Research **Biological Priority:** high **Type:** new

Identify species that are resilient to ocean acidification (OA) and rises in sea surface temperature (SST).

Stressor(s) Addressed By This Conservation Action

Habitat Shifting or Alteration

Broad Taxonomic Group Conservation Actions:

Additional relevant conservation actions for this species are assigned within broader taxonomic groups in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-1.

Habitat Based Conservation Actions:

Additional conservation actions that may benefit habitat(s) associated with this species can be found in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-15. Click on the Habitat Grouping of interest to launch a habitat based report summarizing relevant conservation actions and associated SGCN.

The Wildlife Action Plan was developed through a lengthy participatory process with state agencies, targeted conservation partners, and the general public. The Plan is non-regulatory. The species, stressors, and voluntary conservation actions identified in the Plan complement, but do not replace, existing work programs and priorities by state agencies and partners.